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=> d his

     (FILE 'HOME' ENTERED AT 09:56:29 ON 02 FEB 2007)
     FILE 'CA' ENTERED AT 09:56:36 ON 02 FEB 2007
         E MEIER KIRCHNER G/AU
L1     1 S E4
         E KIRCHNER G/AU
L2    56 S E3,E14
         E MEIER G/AU
L3   241 S E3,E41-42
         E REXIN M/AU
L4     3 S E3-4
         E HRUBESH L/AU
L5    99 S E3,E5-7,E9-10
         E MADDUX A/AU
L6     8 S E3-6
         E MORRISON R/AU
L7   100 S E3,E21,E38-43,E47,E75,E78,E95,E111-112,E117
         E BARON P/AU
L8   111 S E3-4,E14-16
L9    41 S L1-8 AND(MICROWAVE OR TERAHERTZ OR THZ OR SUBMILLIMETER OR SUB
         MILLIMETER OR SUBMM OR SUB MM)
L10 2784 S (SPECTROMETER OR SPECTROGRAPH OR ANALYZER OR RADIOMETER)(6A)
         (MICROWAVE OR TERAHERTZ OR THZ OR SUBMILLIMETER OR SUB MILLIMETER
         OR SUBMM OR SUB MM)
L11   24 S L10 (10A)(COMPACT OR PORTAB?)
L12   30 S L10 AND (SCHOTTKY OR DETECT?)(2A)DIODE
L13   11 S L10(10A) SOLID STATE
L14  667 S L10 AND(GAS? OR VAPOR? OR VOLATIL?)
L15   93 S L10 AND(FLOW? OR MEASUR? OR ABSORPTION)(3A)CELL
L16   28 S L10 AND FLOW?(3A)(GAS? OR VAPOR? OR VOLATIL?)
L17   67 S L10 AND(POLLUTION OR INDUST?)
L18  182 S L10 AND (TRACE OR ROTATIONAL(2A)SPECTRO?)
L19   88 S (L14 OR AIR(1A)ANALY?)AND L18
L20   15 S L10 AND FREQUENCY(2A)(CALIBRAT? OR REFERENC?)
L21  293 S L9,L11-13,L15-17,L19-20 AND PY<2003

=> d bib,ab l21 1-293

L21  ANSWER 11 OF 293  CA  COPYRIGHT 2007 ACS on STN
AN   137:66976  CA
TI   Evaluation of Fourier-transform microwave spectroscopy as a tool for
     quantitative analysis: signal stability considerations
AU   DaBell, Ryan S.; Chu, Pamela M.; Fraser, Gerald T.; Suenram, Richard D.
CS   Analytical Chemistry Division, Chemical Science and Technology
     Laboratory, National Institute of Standards and Technology,
     Gaithersburg, MD, 20899, USA
SO   Proceedings of SPIE-The International Society for Optical Engineering
     (2002), 4574(Instrumentation for Air Pollution and Global Atmospheric
     Monitoring), 216-224
AB   There is a continuing need for improved anal. techniques to measure the
     concn. of trace gases for monitoring hazardous air pollutants,
     industrial emissions, chem.-warfare agent release, etc.  Methods of
     anal. that can conclusively identify several analytes in a mixt. are
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particularly desired. Towards this end, the use of Fourier-transform microwave (FTMW) spectroscopy as a quant. anal. technique has been proposed. The high spectral resoln. of FTMW provides a quick and unambiguous method for identifying multiple analytes in the **gas** phase. A small-scale FTMW spectrometer has recently been constructed for use in quant. anal. Prior to the present investigation, however, the use of this spectrometer in quant. work has not been rigorously evaluated. This work summarizes efforts to identify and categorize sources of signal instability in the FTMW spectrometer. Methods employed to minimize these effects will also be discussed.

L21 ANSWER 17 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 136:76966 CA
TI Wideband terahertz sensing and spectroscopy with electronic sources and detectors
AU Van Der Weide, D. W.
CS Department of Electrical and Computer Engineering, University of Wisconsin-Madison, Madison, WI, 53706, USA
SO NATO Science Series, II: Mathematics, Physics and Chemistry (**2001**), 27 (Terahertz Sources and Systems), 301-314
AB A growing variety of reflection and transmission spectroscopy in the 1-1000 GHz regime can be done with wideband all-electronic **terahertz** (**THz**) **spectrometers**. The authors have measured gas absorption spectra and energetic material reflection spectra with such instruments using phase-locked microwave sources to drive picosecond GaAs nonlinear transmission lines, enabling measurement of both wideband spectra and single lines with Hertz-level precision, a new mode of operation not readily available with optoelectronic THz techniques. The authors take 2 approaches to coherent measurements: (1) spatially combining the freely propagating beams from 2 coherent picosecond pulse generators (which have discrete spectra ranging from □ 6 to > 500 GHz), or (2) using a more conventional coherent source/detector arrangement with sampling detectors. The 1st method employs a dual-source interferometer (DSI) modulating each harmonic of 1 source with a precisely-offset harmonic from the other source-both sources being driven with stable phase-locked synthesizers-the resultant beat frequency can be low enough for detection by a std. composite bolometer. Room-temp. detection possibilities for the DSI include antenna-coupled **Schottky diodes**. Finally, the authors have recently introduced a reflectometer based on serrodyne modulation of a linearized delay line, using a technique that is process-compatible with pulse generator circuits.

L21 ANSWER 82 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 125:157314 CA
TI Quantitative measurement of analyte **gases** in a **microwave spectrometer** using a dynamic sampling method
AU Zhu, Z.; Matthews, I. P.; Samuel, A. H.
CS Dep. of Epidemiology and Public Health, Univ. of Wales, Cardiff, CF4 4XN, UK
SO Review of Scientific Instruments (**1996**), 67(7), 2496-2501
AB This article reports quant. measurement of concns. of water **vapor** (absorption line at 22.235 GHz) and ethylene oxide (absorption line at 23.123 GHz) in different **gas** mixts. by a **microwave spectrometer**. The

problem of absorption line broadening and the **gas** memory problem inherent in the quant. anal. of **gases** using microwave mol. **rotational spectroscopy** were solved. The line broadening problem was minimized by **gas** diln. with nitrogen and the **gas** memory problem was effectively reduced by a dynamic sampling method. Calibration of ethylene oxide with a diln. factor of 5 demonstrated that the std. deviation of the calibration data were <4.2%. A typical ethylene oxide sterilization prodn. cycle was chosen to monitor chamber ethylene oxide concns. in the **gas** dwell phase and the repeatability of these real time measurements was 2.7%.

L21 ANSWER 106 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 121:217236 CA
TI **Microwave spectrometer**
IN Gibson, Colin; Matthews, Ian Price; Samuel, Alan Herbert; Zhu, Zhangwhu
PA University of Wales College of Medicine, UK
SO Brit. UK Pat. Appl., 40 pp.
PI GB 2273986 A 19940706 GB 1992-27050 19921229
PRAI GB 1992-27050 19921229
AB **Microwave spectrometers** including a sensing chamber into which is introduced a gas or constituent to be analyzed by exposure to microwave radiation directed into the chamber are described in which at least two of the chamber resonant frequency, the microwave frequency, and the center frequency of the absorption peak are varied independently and the resultant variation in intensity of the microwave radiation in the chamber is monitored to det. the concn. of the gas within said chamber . The spectrometer may include a **frequency** measuring and **ref.** system incorporating a ref. cavity for measuring the resonant frequency of the chamber. The chamber resonant frequency may be varied by moving a member or wall (e.g., using a piezoelec. driver element), by opening or closing an aperture, or by varying the impedance of the chamber (e.g., using a varactor diode). Adjustment of the absorption peak frequency may be accomplished by exposing the gas to a varying elec. or magnetic field or by applying energy from a pumping source.

L21 ANSWER 126 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 115:294051 CA
TI **Microwave spectrometer**
IN Brown, Ronald D.; Godfrey, Peter D.; Crofts, Jonathan G.
PA Monash University, Australia
SO U.S., 6 pp.
PI US 5057782 A 19911015 US 1990-555391 19900816
PRAI AU 1988-6983 A 19880226
AB A spectrometer, for analyzing a sample substance, comprises a chamber for supporting a sample to be analyzed. A gas-drive circuit communicates with the chamber and the gas-drive circuit and chamber are at least partly enclosed within a heated jacket. The **gas flow** through the **gas** circuit and chamber entrains sample mols. in the flow and a nozzle is provided to spray the **gas flow** and entrained mols. as a supersonic beam seeded with the mols. between a pair of plates between which an elec. field is created. The electrodes comprise Stark electrodes. A microwave source and a receiver are arranged so that the source produces a microwave beam which passes through the supersonic

beam as the beam expands between the electrodes which is detected by the detector. The detector detects an absorption signal of the mols. which seed the supersonic beam.

L21 ANSWER 161 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 102:86755 CA
TI The microwave spectrum of the chloromethyl radical, CH2Cl
AU Endo, Yasuki; Saito, Shuji; Hirota, Eizi
CS Inst. Mol. Sci., Okazaki, 444, Japan
SO Canadian Journal of Physics (**1984**), 62(12), 1347-60
AB The gas phase pure rotational spectrum of CH2Cl was obsd. for the 1st time in the millimeter wave region using a source frequency modulation **microwave spectrometer** equipped with a 1 m long free space **absorption cell**. The radical was generated by the reaction of CH3Cl with 2450-MHz microwave discharge products of CF4. The a-type R-branch transitions were obsd. with resolved fine and hyperfine components for both the 35Cl and 37Cl isotopic species in the ground vibrational state. The small pos. inertial defect, $\Delta 0$ = 0.0333 amu Å2, calcd. from the rotational consts. obtained for the 35Cl species indicates that the radical is planar in the ground vibronic state. The obsd. fine and hyperfine interaction consts. are consistent with 2B1 symmetry, i.e., with the unpaired electron occupying a $p\pi$ orbital extending perpendicular to the mol. plane.

L21 ANSWER 170 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 98:207264 CA
TI A broadband **submillimeter** wave **spectrometer** system with on-line microcomputer data analysis
AU Schaefer, Eckhard; Winnewisser, Manfred
CS Phys. Chem. Inst., Justus-Liebig-Univ., Giessen, D-6300, Fed. Rep. Ger.
SO Berichte der Bunsen-Gesellschaft (**1983**), 87(4), 327-34
AB A **submillimeter** wave **spectrometer** operating in the frequency range 100 to 800 GHz was constructed for the study of transient mols. in the gas phase. The instrument employs harmonic generation of millimeter wave frequencies and a He-cooled InSb photoconducting detector. A high degree of flexibility is achieved using an exchangeable free-space Pyrex **absorption cell** and a microcomputer for on-line data anal. The spectrometer can be operated in a free-running video mode together with a fast signal averager or phase-locked to a microwave ref. with source modulation. The reproducibility of line center frequency measurements up to 600 GHz is $\pm$10 kHz. Transitions with absorption coeffs. of at least 3 $\times$ 10-8 cm-1 can be detected in the range from 150 to 250 GHz. Ground state rotational transitions of OCS between 200 and 690 GHz are reported and analyzed together with previous data.

L21 ANSWER 202 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 89:190421 CA
TI **Gas** analysis by computer-controlled **microwave rotational spectrometry**
AU **Hrubesh, Lawrence W.**
CS Lawrence Livermore Lab., Univ. California, Livermore, CA, USA
SO Applied Spectroscopy (**1978**), 32(5), 425-9
AB **Microwave rotational spectrometry** has inherently high resoln. and is thus nearly ideal for qual. **gas** mixt. anal. Quant. **gas** anal. is also

possible by a simplified method which utilizes the ease with which mol. rotational transitions can be satd. at low **microwave** power d. A computer-controlled **microwave spectrometer** which is used to demonstrate for the first time a totally automated anal. of a complex **gas** mixt. is described. Examples are shown for a complete qual. and quant. anal., in which a search of over 100 different compds. is made in <7 min, with sensitivity for most compds. in the 10-100 ppm range. This technique is expected to find increased use in view of the reduced complexity and increased reliability of **microwave spectrometers** and because of new energy-related applications for anal. of mixts. of small mols.

L21 ANSWER 212 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 87:15425 CA
TI Ammonia preconcentrator/integrator instruction manual
AU **Hrubesh, L.**; Barton, V.; Morris, C.
CS Lawrence Livermore Lab., Univ. California, Livermore, CA, USA
SO Report (**1976**), UCID-17174, 27 pp. Avail.: NTIS From: ERDA Energy Res. Abstr. 1976, 1(11), Abstr. No. 24377
AB **Microwave** rotational spectrometry is a very selective analytical technique for NH3. Some form of preconcn. of NH3 is required for detection limits below 100 ppb. Work with various trap materials for NH3 suggested using chromatog. packing material. Chromosorb 104 provided an efficient trap and quant. released the NH3 upon slight heating. A preconcentrator/integrator module to thoroughly test the concept of quant. preconcn. by the method of adsorption-desorption on chromatog. packing materials was constructed and used in conjunction with the **microwave** spectrometer detector to provide quant. data of trapping efficiency and reproducibility in NH3 detns.

L21 ANSWER 247 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 77:55947 CA
TI **Microwave** spectroscopy. Design of an analytical **spectrometer**
AU Cuthbert, J.; Denney, E. J.; Silk, C.; Stratford, R.; Farren, J.; Jones, T. L.; Pooley, D.; Webster, R. K.; Wells, F. H.
CS Cambridge Sci. Instrum. Ltd., Cambridge, UK
SO Journal of Physics E: Scientific Instruments (**1972**), 5(7), 698-704
AB The design of a **microwave spectrometer** for use primarily by the anal. chemist is described, with particular emphasis on the way in which previously limiting problems have been overcome. Advances in the design of the sample handling facilities, the **absorption cell** and the data processing system are described in detail and the performance of the complete spectrometer is illustrated.

L21 ANSWER 272 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 67:59502 CA
TI **Microwave spectrometer**
IN Kuhn, Nicholas John
PA Hewlett-Packard Co.
SO U.S., 4 p.
PI US 3317827 19670502 US 1964-342487 19640204
AB A microwave signal having a selected frequency is applied along one signal path to the test sample in an **absorption cell**. The same microwave is combined with the signal at the output of the **absorption**

cell, in proper phase relation to cancel substantially the entire signal, leaving only a fractional portion of the total power for application to a microwave detector. This permits the power applied to the sample to be varied over a wide range while that applied to the detector remains substantially unchanged. The detector responds to variations caused by varying absorption as the excitation in the **absorption cell** (e.g. an electrostatic field in a Stark cell) is periodically varied between selected levels. A 3rd signal arm including a microwave power modulator is connected between the microwave source and the detector to produce a variation in power substantially equal to the variations caused by the sample. An abs. indication of the coeff. of absorption of the sample is thus provided when the 3rd arm is adjusted to cause the detector to produce an identical reading. Suitable app. is described.

L21 ANSWER 278 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 65:35261 CA
OREF 65:6538c
TI Free radical microwave absorption meter
AU Radford, H. E.
CS Natl. Bur. of Stds., Washington, DC
SO Review of Scientific Instruments (**1966**), 37(6), 790-2
AB A simple **microwave spectrometer** is described which can be used to measure abs. concns. of free radicals at any point in a conventional **gas flow** reaction system. The spectrometer displays true absorption line profiles and is sensitive to microwave line depths (peak absorption coeff. × path length) as small as 10-5. The instrument can be assembled from com. available components at a cost comparable with that of a good optical monochromator.

L21 ANSWER 279 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 65:33059 CA
OREF 65:6173c-d
TI Application of microwave spectroscopy to contaminant analysis
AU White, William F.
CS Natl. Aeron. & Space Admin., Hampton,, VA
SO Chemical Engineering Progress, Symposium Series (**1966**), 62(63), 70-5
AB Microwave spectroscopy is suggested as a detector capable of pos. identifying **trace gases** in a mixt. and indicating the abundance of each. Recent developments in microwave technology, such as automatic programming and the backward wave oscillator, indicate that **microwave spectrometers** should find widespread immediate use in the lab. and possible future use in space vehicles.

L21 ANSWER 286 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 53:21336 CA
OREF 53:3885b-c
TI **Microwave spectrometer** for the study of free radicals
AU Hurle, I. R.; Sugden, T. M.
CS Univ. Cambridge, UK
SO Journal of Scientific Instruments (**1958**), 35, 319-23
AB A **microwave spectrometer** suitable for the study of short-lived mols. in the gas phase, in particular free radicals, is described. The frequency

range is about 20 to 70 × 103 Mc./sec. Use was made of surface wave propagation of the microwaves along a wire in the **absorption cell**. High sensitivity is obtained by using a radiofrequency modulation of the klystron source. Results for CS are also presented.

L21 ANSWER 288 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 51:42278 CA
OREF 51:7868f-g
TI A "free space" **absorption cell** for microwave spectroscopy
AU Costain, C. C.
CS Natl. Research Council, Ottawa
SO Can. J. Phys. (**1957**), 35, 241-7
AB The **absorption cell** consists simply of a Pyrex tube with a polystyrene lens and microwave horn at each end to couple to the standard microwave components. The lenses also serve as the vacuum windows. The attenuation at 8.5 mm. wave length is 3.4 db. for a 250-cm. cell. Since there are no metal surfaces, this type of cell is very suitable for the investigation of reactive mols. It can readily be employed in a high-temp. **microwave spectrometer** for the investigation of corrosive substances with low vapor pressure, or in a Zeeman modulation spectrometer for the study of free radicals.

L21 ANSWER 289 OF 293 CA COPYRIGHT 2007 ACS on STN
AN 50:43506 CA
OREF 50:8331b-c
TI A **microwave spectrometer** for the study of spectra of free radicals
AU Low, W.; Ramberg, Y.
CS Hebrew Univ., Jerusalem
SO Bulletin of the Research Council of Israel (**1955**), 5A, 40-5
AB A **microwave spectrometer** for the detection of spectra of free radicals is described. The spectrometer is based on Zeeman modulation technique. A detailed description of the **absorption cell** and assorted components is given.

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FILE 'CA' ENTERED AT 15:01:02 ON 01 FEB 2007
L1 7846 S (MICROWAVE OR SUBMILLIMETER OR SUB MILLIMETER OR SUBMM OR SUB MM) (3A) SPECTRO?
L2 31 S L1 AND (SCHOTTKY OR DETECT?) (2A) DIODE
L3 74 S L1 AND SOLID STATE
L4 23 S L1 (10A) (COMPACT OR PORTAB?)
E REISS K/AU
L5 19 S E3,E12-13
L6 0 S L1 AND L5
L7 3 S L1 AND FREQUENCY MARKER
L8 12506 S (MICROWAVE OR SUBMILLIMETER OR SUB MILLIMETER OR SUBMM OR SUB MM) (3A) SPECTRA?
L9 12 S L8 AND (SCHOTTKY OR DETECT?) (2A) DIODE

L10 85 S L8 AND SOLID STATE
L11 16 S L8 (10A)(COMPACT OR PORTAB?)
L12 4 S L8 AND FREQUENCY MARKER
L13 217 S L2-4,L7,L9-12
L14 186 S L13 AND PY<2003
L15 11 S L13 NOT L14 AND 2003/PY

=> d bib,ab l14 1-186

L14 ANSWER 1 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 138:359706 CA
TI **Microwave** scanning **spectrometer** for studies of rotational spectra
AU Galica, J.; Gierszal, S.; Grembowski, J.; Mis-Kuzminska, E.
CS Institute of Molecular Physics, Polish Academy of Sciences, Poznan, 60-179, Pol.
SO Molecular Physics Reports (**2001**), 34(2, Modern Magnetic Resonances), 84-89
AB The spectrometer operates in the frequency range of 18-40 GHz with an instrumental resoln. of 40-100 kHz and an absorption sensitivity of an order 10-8 cm-1. The instrument utilizes synthesized generator as the tuneable coherent source of radiation, generator of rectangular signal 10 kHz for mol. modulation, absorption cavity with Stark septum and **Schottky diode detector**. Stark modulation and use of a lock-in amplifier achieve phase-sensitive detection. Spectra are recorded by tuning of synthesizer and data acquisition system, which is done under computer control. The rotational spectra of J = 2 ← 1, J = 3 ← 2 transitions in the ground vibrational state (0,0,0) for several isotopic species as well as few lines in excited vibrational states were obsd. The Stark effect, pressure broadening of the J = 2 ← 1 ground state line, (Cw = 6.07 ± 0.04) MHz/Torr and pressure shift of this line (Cs = 191 ± 4) Hz/mTorr were measured.

L14 ANSWER 13 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 134:23298 CA
TI Frequency multipliers for extension of frequency range of millimeter wave synthesizers
AU Schitov, A. M.; Golubyatnikov, G. Yu.; Tretyakov, M. Yu.; Volokhov, S. A.; Walters, A.
CS Institute of Electronic Measurements KVARZ, Nizhny Novgorod, Russia
SO International Journal of Infrared and Millimeter Waves (**2000**), 21(9), 1479-1488
AB This paper has a deal with the frequency range extension of millimeter wave synthesizers (26-118 GHz) through frequency multiplication to provide a reliable, relatively inexpensive, and simple in operation tunable synthesized sources up to submillimeter-wavelength band. Frequency doublers and triplers using planar GaAs **Schottky** barrier **diodes** as the nonlinear element were developed. Description of their waveguide mounts having no any external tunings and biasing is given. Harmonic generation conversion loss at various frequencies for several practical multiplier assemblies are presented. Examples of practical application of such source (synthesizer + multiplier) in **microwave spectroscopy** are demonstrated.

L14 ANSWER 19 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 132:129725 CA
TI Spectroscopy with electronic terahertz techniques
AU Van Der Weide, Daniel W.; Murakowski, J.; Keilmann, Fritz
CS Dep. Electr. and Computer Eng., Univ. of Delaware, Newark, DE, USA
SO Proceedings of SPIE-The International Society for Optical Engineering (**1999**), 3828(Terahertz Spectroscopy and Applications II), 276-284
AB The authors report gas absorption spectra and energetic material reflection spectra measured with an all-electronic terahertz (THz) spectrometer. This instrument uses phase-locked microwave sources to drive picosecond GaAs nonlinear transmission lines, enabling measurement of both broadband spectra and single lines with hertz-level precision, a new mode of operation not readily available with optoelectronic THz techniques. The authors take 2 approaches to coherent measurements: (1) spatially combining the freely propagating beams from 2 coherent picosecond pulse generators, or (2) using a more conventional coherent source/detector arrangement with sampling detectors. The 1st method employs a dual-source interferometer modulating each harmonic of 1 source with a precisely-offset harmonic from the other source - both sources being driven with stable phase-locked synthesizers - the resultant beat frequency can be low enough for detection by a std. composite bolometer. Room-temp. detection possibilities for the DSI include antenna-coupled **Schottky diodes**. Finally, the authors have recently introduced a reflectometer based on serrodyne modulation of a linearized delay line, using a technique that is process-compatible with pulse generator circuits.

L14 ANSWER 30 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 130:275803 CA
TI A **portable**, pulsed-molecular-beam, Fourier-transform **microwave spectrometer** designed for chemical analysis
AU Suenram, R. D.; Grabow, Jens Uwe; Zuban, Andrei; Leonov, Igor
CS Optical Technology Division, National Institute of Standards and Technology, Gaithersburg, MD, 20899, USA
SO Review of Scientific Instruments (**1999**), 70(4), 2127-2135
AB M. D. Harmony, K. A. Beran, D. M. Angst, and K. L. Ratzlaff [Rev. sci. Instrum. 66, 5196(1995)] recently published some design specifications for a smaller version of a Fourier transform microwave (FTMW) spectrometer. In that work they used a nozzle arrangement which pulsed the mol. beam perpendicular to the axis of the Fabry-Perot cavity. Even though the size of the vacuum chamber and Fabry-Perot cavity mirrors had been reduced, the overall sensitivity of the instrument was nearly the same as one with a conventional sized resonator. In an effort to establish FTMW spectroscopy as a viable new technique for anal. chemists, the authors have constructed a miniaturized version of the authors' lab. instrument for use as an anal. instrument. The vacuum chamber of the instrument is based on a com. available, multiport 30 cm (12 in.) sphere. An integral end-flange mirror permits a coaxial nozzle injection of the mol. beam which greatly improves the sensitivity of the instrument. The movable cavity mirror rides on a fast motorized stage which allows tuning to any frequency within the range of the spectrometer in 1-2 s. The entire spectrometer is mounted on a mobile cart, allowing it to be easily transported to other labs. or remote locations. The per-pulse sensitivity of this smaller instrument is

slightly less than the larger lab. instruments, however the smaller vacuum chamber allows the nozzle to be pulsed much faster without overloading the vacuum pumps. The new miniaturized FTMW spectrometer is only a factor of 2 less sensitive than the larger lab. instrument. This instrument provides anal. chemists with a new tool that can unambiguously identify trace amts. of large org. compds. in gas streams. The instrument also permits real-time anal. which should be useful for monitoring and optimization of process gas streams. Lower detection limits are typically in the nanomol/mol regime.

L14 ANSWER 34 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 129:325485 CA
TI **Portable** Fourier transform **microwave spectrometer** with cryogenic receiver for trace gas analysis
IN Suenram, Richard D.; Lovas, Francis J.; Grabow, Jens U.; Harmony, Marlin D.; Leonov, Igor; Zuban, Andre
PA The United States of America as Represented by the Secretary of Commerce, USA
SO U.S., 16 pp.
PI US 5831439 A 19981103 US 1997-802517 19970220
PRAI US 1997-802517 19970220
AB A highly **compact**, **portable**, pulsed-mol.-beam Fabry-Perot cavity Fourier transform **microwave spectrometer** which incorporates ultra-fine Fabry-Perot mirror surface finishes was developed for trace gas anal. The mirrors, having a surface finish of less than or equal to 0.25 μ root-mean-square, are coated with nickel and then with either gold or silver. In a further embodiment, one or more fixed-tuned Fabry-Perot cavities are incorporated within a single vacuum chamber to monitor one or more chem. species of interest.

L14 ANSWER 37 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 128:173838 CA
TI Phase locked backward wave oscillator pulsed beam **spectrometer** in the **submillimeter** wave range
AU Lewen, F.; Gendriesch, R.; Pak, I.; Paveliev, D. G.; Hepp, M.; Schieder, R.; Winnewisser, G.
CS I. Physikalisches Institut, Universitat zu Koln, Koln, D-50937, Germany
SO Review of Scientific Instruments (**1998**), 69(1), 32-39
AB The authors have developed a new submillimeter wave pulsed mol. beam spectrometer with phase stabilized backward wave oscillators (BWOs). In the frequency ranges of 260-380 and 440-630 GHz, the BWOs output power varies between 3 and 60 mW. Part of the radiation was coupled to a novel designed harmonic mixer for submillimeter wavelength operation, which consists of an advanced whiskerless **Schottky diode** driven by a harmonic of the ref. synthesizer and the BWO radiation. The resulting intermediate frequency of 350 MHz passed a low noise high electron mobility transistor amplifier, feeding the phase lock loop (PLL) circuit. The loop parameters of the PLL were carefully adjusted for low phase noise. The half power bandwidth of the BWO radiation at 330 GHz is ≥80 MHz, impressively demonstrating the low phase noise operation of a phase locked BWO. A double modulation technique was employed by combining an 80 Hz pulsed jet modulation and a 10-20 kHz source modulation of the BWO and reaching a min. detectable fractional

absorption of 2×10-7. For the 1st time, a no. of pure rotational (Ka = 3←2, Ka = 4←3) and rovibrational transitions in the van der Waals bending and stretching bands of the Ar-CO complex were recorded.

L14 ANSWER 45 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 123:354123 CA
TI A **compact** hot-nozzle Fourier-transform **microwave spectrometer**
AU Harmony, Marlin D.; Beran, Kyle A.; Angst, Deanna M.; Ratzlaff, Kenneth L.
CS Dep. of Chemistry, University of Kansas, Lawrence, KS, 66045, USA
SO Review of Scientific Instruments (**1995**), 66(11), 5196-202
AB A newly constructed pulsed nozzle, Fourier-transform microwave spectrometer utilizes a Fabry-Perot cavity consisting of spherical resonators having diams. of only 10 cm. Tests of this very compact-cavity system showed that its sensitivity was only slightly lower than that of a comparably configured system of the Balle-Flygare design having resonators with diams. of 36 cm. With a vol. 50 times smaller than in conventional systems, the compact cavity also requires a much smaller vacuum chamber which can be pumped by a relatively small 6 in. diffusion pump. The system includes an integral ceramic nozzle which can be heated to temps. above 1000°. Spectrometer characteristics were demonstrated by means of expts. on OCS isotopomers in ground and excited vibrational states, ArOCS complexes, and chloroketene, a reactive intermediate formed by pyrolysis of chloroacetylchloride.

L14 ANSWER 50 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 122:199875 CA
TI Extension of the range of **microwave spectroscopy** up to 1.3 THz
AU Krupnov, A. F.; Tretyakov, M. Yu.; Dryagin, Yu. A.; Volokhov, S. A.
CS applied Physics Inst., Russian Acad. Sci., Nizhnii Novgorod, Russia
SO Journal of Molecular Spectroscopy (**1995**), 170(1), 279-84
AB A **Schottky diode** was used for harmonic generation of submillimeter BWO radiation and a new upper limit is set for the frequencies used in **microwave spectroscopy**.

L14 ANSWER 54 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 121:45394 CA
TI A millimeter/**submillimeter spectrometer** for high resolution studies of transient molecules
AU Ziurys, L. M.; Barclay, W. L., Jr.; Anderson, M. A.; Fletcher, D. A.; Lamb, J. W.
CS Dep. Chem., Arizona State Univ., Tempe, AZ, 85287-1604, USA
SO Review of Scientific Instruments (**1994**), 65(5), 1517-22
AB A design is presented for a millimeter/**submillimeter** direct absorption **spectrometer** for studies of the pure rotational spectra of metal-bearing free radicals. The spectrometer operates in the frequency range of 65-550 GHz with an instrumental resoln. of 200-1000 kHz and an absorption sensitivity of a few ppm. The instrument utilizes phase-locked Gunn oscillators as the tunable, coherent source of radiation from 65-140 GHz. Higher source frequencies are obtained with **Schottky diode** multipliers. The gas cell and optics path are designed utilizing Gaussian beam optics to achieve max. interaction between mols. and the mm-wave radiation in the reaction region. Scalar feedhorns and a series

of PTFE lenses are used to propagate the source signal. The gas cell is a cylindrical tube 0.5 m in length with a detachable Broida-type oven. The detector for the spectrometer is a helium-cooled InSb hot electron bolometer. Phase-sensitive detection is achieved by FM modulation of the Gunn oscillators and use of a lock-in amplifier. Spectra are recorded by elec. tuning of the Gunn oscillator, which is done under computer control. The millimeter and **sub-mm** rotational **spectra** of several free radicals have been obsd. for the first time using this instrument, including CaOH, MgOH, CaH, MgF, and BaOH.

L14 ANSWER 95 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 105:15008 CA
TI Millimeter-wave spectroscopy with a **solid-state** IMPATT oscillator source
AU Isaacs, N. A.; Russell, D. K.
CS Dep. Chem., Univ. Leicester, Leicester, LE1 7RH, UK
SO Review of Scientific Instruments (**1986**), 57(3), 414-16
AB A spectrometer was designed and constructed, for the observation of high-resoln. absorption spectra in the millimeter wave region using a **solid-state** IMPATT oscillator as a source. Details of the spectrometer are presented, together with the 1st results obtained using the new instrument.

L14 ANSWER 101 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 103:131486 CA
TI **Submillimeter**-wave heterodyne **spectroscopy** with a **compact solid state** radiometer
AU Taylor, John A.; Tannenwald, Peter E.; Erickson, Neal R.; Dionne, Gerald F.; Fitzgerald, James F.
CS Lincoln Lab., Massachusetts Inst. Technol., Lexington, MA, 02173, USA
SO International Journal of Infrared and Millimeter Waves (**1985**), 6(8), 687-95
AB A compact, **solid state** submillimeter-wave heterodyne radiometer was developed and used to measure spectral characteristics of a water vapor jet in a space simulation chamber. Features of the 557-GHz water vapor line profile were obsd. in significantly greater detail than in previous expts. through an increased sensitivity and improved frequency resoln. (600 kHz). The local oscillator of the radiometer consisted of a frequency multiplication chain which was driven by an InP Gunn oscillator at 92.6 GHz, and which contained a frequency tripler and harmonic mixer in cascade. The front end of the receiver had a noise temp. of 4500 K (DSB) at 555 GHz, consumed 3 W and weighed 3 kg. This advance in technol. is particularly relevant to submillimeter-wave radiometry from a space-based platform.

L14 ANSWER 126 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 95:92719 CA
TI Millimeter wave absorption spectra of biological samples
AU Gandhi, O. P.; Hagmann, M. J.; Hill, D. W.; Partlow, L. M.; Bush, L.
CS Dep. Electr. Eng., Univ. Utah, Salt Lake City, UT, 84112, USA
SO Bioelectromagnetics (New York, NY, United States) (**1980**), 1(3), 285-98
AB A **solid-state** computer-controlled system was used to make swept-frequency measurements of absorption by biol. specimens from 26.5 to 90.0 GHz. A wide range of samples was used, including solns. of DNA and

RNA, and suspensions of BHK-21/C13 cells, Candida albicans, C. krusei, and Escherichia coli. Sharp spectra reported by other workers were not obsd. The strong absorbance of water (10-30 dB/mm) caused the absorbance of all aq. prepns. examd. to have a water-like dependence on frequency. Redn. of incident power (to <1.0 μW), elimination of modulation, and control of temp. to assure cell viability did not significantly alter the water-dominated absorbance. Frozen samples of BHK-21/C13 cells tested at dry ice and liq. N temps. had av. insertion loss reduced to 0.2 dB/cm but still showed no reproducible peaks that could be attributed to absorption spectra. Thus, the spectral resonances reported by others are likely to be in error.

L14 ANSWER 133 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 91:48805 CA
TI Portable microwave multi-gas analyzer development
AU Hrubesh, L. W.; Maddux, A. S.; Johnson, D. C.; Morrison, R. L.; Nielson, J. N.; Malachosky, M.
CS Lawrence Livermore Lab., Univ. California, Livermore, CA, USA
SO Report (**1978**), UCID-17867, 110 pp. Avail.: NTIS From: Energy Res. Abstr. 1979, 4(6), Abstr. No. 14513
AB A microwave rotational spectrometer capable of detecting and monitoring several compds. in a single, easy to use, reliable and transportable instrument was developed. It is the only gas analyzer known where the user can select by pushbutton any 1 of 10 different compds. for specific and sensitive detection from a sampled mixt. Also, no other gas anal. instrument of equiv. potential cost can offer near abs. selectivity and better than 3% quant. accuracy at part per million detection limits. The instrument embodies the state-of-the-art concepts and hardware for microwave rotational spectrometry. The analyzer meets or exceeds the design specifications established at the start of the development. A comparison of design specifications is given.

L14 ANSWER 138 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 89:139741 CA
TI A measuring system for the industrial application of **microwave spectroscopy**
AU Schiek, B.; Schilz, W.; Paukner, T.
CS Forschungslab. Hamburg, Philips G.m.b.H., Hamburg, Fed. Rep. Ger.
SO Journal of Microwave Power (**1977**), 12(4), 347-59
AB A **compact** all **solid-state microwave spectrometer** for quant. anal. of gas mixts. consists of a signal source, an absorption cell, a detector-preamplifier unit, and a gas-flow system. The app. operates at 18-26 GHz. The system was optimized with respect to sensitivity and noise and a no. of measurements on gases and gas mixts. are described.

L14 ANSWER 140 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 88:109884 CA
TI A **microwave spectrometer** - suitable for gas analysis in industrial applications
AU Schiek, B.; Paukner, T.; Schilz, W.
CS Forschungslab., Philips G.m.b.H., Hamburg, Fed. Rep. Ger.
SO Conf. Proc. - Eur. Microwave Conf., 7th (**1977**), 251-5 Publisher: Microwave Exhibitions Publ. Ltd., Sevenoaks, Engl.

AB A compact **solid-state** spectrometer operating at 18-28 GHz is used in process and pollution control. System noise is minimized by balanced arrangement of 2 absorption cells operating in parallel. For low concn. the detector output voltage is proportional to gas concns.; at high concns. strong deviation from linearity occurs. Detection limits for C2H4S2 [624-72-6] and NH3 were 20 and 10 ppm, resp.

L14 ANSWER 160 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 77:159860 CA
TI Microwave cavity gas analyzer
IN Hrubesh, Lawrence W.; Anderson, Roger E.
SO U.S., 5 pp.
PI US 3691454 A 19720912 US 1970-81798 19701019
PRAI US 1970-81798 A 19701019
AB A gas analyzer uses a **solid state** source of microwave energy to excite a cavity resonator of a Fabry-Perot type which is adapted to accommodate a gas sample to be analyzed. The frequencies of the microwave energy within the cavity are detected at the time a portion of the energy is absorbed by the gas sample. Since such frequencies of absorption differ for different gases, the presence of a particular gas in the sample is detected. One plate of the Fabry-Perot cavity resonator is moveable toward and away from the other to vary simultaneously the resonant frequency of the cavity and the output frequency of the **solid state** source.

L14 ANSWER 172 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 68:7986 CA
TI **Solid state microwave spectrometer**
AU Britt, Chester O.
CS Univ. of Texas, Austin, TX, USA
SO Review of Scientific Instruments (**1967**), 38(10), 1496-501
AB A Si **solid state microwave spectrometer** is described. It is more stable and reliable than comparable tube type circuits, is relatively low in cost, and produces a compact instrument. It is Stark-modulated and can supply a Stark voltage of 2000 v. into an external load of 1000 pf. The sweep generator employed is capable of electronic sweep durations of 0.1 to 8000 sec., with either a backward wave or reflex klystron oscillator signal source. The max. sensitivity is limited only by the sample cell and detector noise.

L14 ANSWER 186 OF 186 CA COPYRIGHT 2007 ACS on STN
AN 42:8399 CA
OREF 42:1822a
TI Microwave spectrum **frequency markers**
AU Carter, Robert L.; Smith, Wm. V.
CS Duke Univ., Durham, NC
SO Physical Review (**1947**), 72, 1265-6
AB A method of calibrating **microwave spectra** is described. The markers have a spacing of 0.2-10 megacycles with a line width of 50 kilocycles or less.

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